SHIKSHA CLASSES,BHANDARA

FULL TEST-3

CHEMISTRY , PHYSICS, BIOLOGY

Time : - 3 Hours   **Max. Marks:- 720**   **Date : ....**

INSTRUCTIONS :

1. The test is of 3 hours duration.

2. The Test Booklet consists of 180 questions. The maximum marks are 720.

3. There are three parts in the question paper A, B, C consisting of Chemistry, Physics having 45 questions each and Biology having 90 questions of equal weightage. Each question is allotted 4 (four) marks for each correct response. ¼ (one fourth) marks will be deducted for indicating incorrect response of each question. No deduction from the total score will be made if no response is indicated for an item in the answer sheet.

4. There is only one correct response for each question. Filling up more than one response in each question will be treated as wrong response and marks for wrong response will be deducted accordingly.

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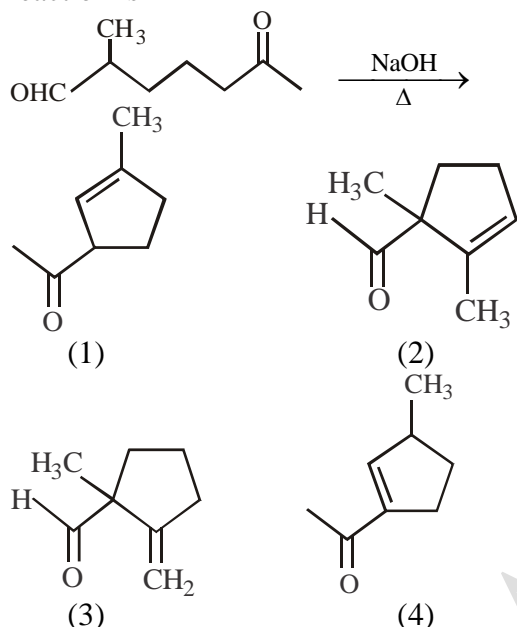
PART A – CHEMISTRY

Q.1 Diborane (B_2H_6) reacts independently with O_2 and H_2O to produce, respectively
(1) HBO_2 and H_3BO_3 (2) H_3BO_3 and B_2O_3
(3) B_2O_3 and H_3BO_3 (4) B_2O_3 and $[BH_4]^-$

Q.2 The major product obtained in the following reaction is

NaOH, Δ

(1)   (2)

(3)   (4)

Q.3 The calculated spin-only magnetic moments (BM) of the anionic and cationic species of $[Fe(H_2O)_6]_2$ and $[Fe(CN)_6]$, respectively, are :
(1) 4.9 and 0   (2) 2.84 and 5.92
(3) 0 and 4.9   (4) 0 and 5.92

Q.4 The ore that contains the metal in the form of fluoride is :
(1) magnetite   (2) sphalerite
(3) malachite   (4) cryolite

Q.5 The ratio of number of atoms present in a simple cubic, body centered cubic and face centered cubic structure are, respectively :
(1) 1 : 2 : 4   (2) 8 : 1 : 6
(3) 4 : 2 : 1   (4) 4 : 2 : 3

Q.6 Coupling of benzene diazonium chloride with 1-napthol in alkaline medium will give
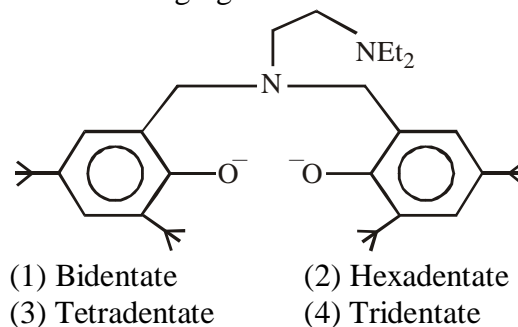

(1)   (2)

(3)   (4)
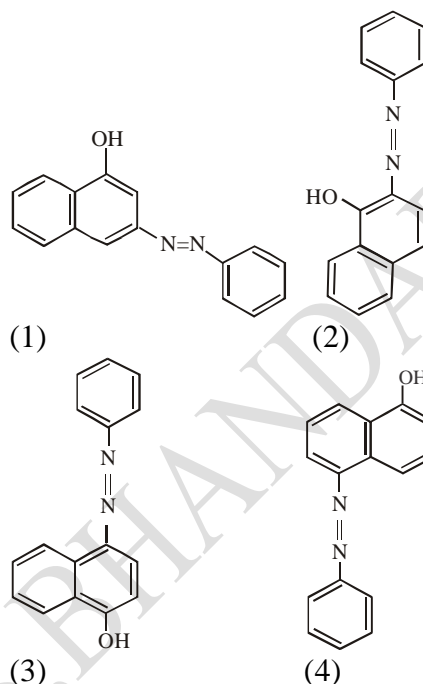
Q.7 The species that can have a trans-isomer is :
(en = ethane-1, 2-diamine, ox = oxalate)
(1) $[Pt(en)Cl_2]$ (2) $[Cr(en)_2(ox)]^+$
(3) $[Zn(en)Cl_2]$ (4) $[Pt(en)_2Cl_2]^{2+}$

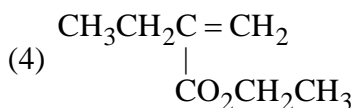**Q.8** Excessive release of CO_2 into the atmosphere results in :
(1) polar vortex   (2) depletion of ozone
(3) formation of smog (4) global warming

Q.9 The following ligand is

(1) Bidentate   (2) Hexadentate
(3) Tetradentate   (4) Tridentate

SPACE FOR ROUGH WORK

Q.10 Given :

Gas	H_2	CH_3	CO_2	SO_2
Critical Temperature/K	33	190	304	630

On the basis of data given above, predict which of the following gases shows least adsorption on a definite amount of charcoal ?
(1) H_2 (2) CH_4
(3) SO_2 (4) CO_2

Q.11 In the following reaction

Aldehyde + Alcohol $\xrightarrow{\text{HCl}}$ Acetal

Aldehyde	Alcohol
HCHO	^{t}BuOH
CH_3CHO	MeOH

The best combinations is :
(1) HCHO and MeOH
(2) HCHO and ^{t}BuOH
(3) CH_3CHO and MeOH
(4) CH_3CHO and ^{t}BuOH

Q.12 The chemical nature of hydrogen preoxide is :
(1) Oxidising and reducing agent in acidic medium, but not in basic medium.
(2) Oxidising and reducing agent in both acidic and basic medium.
(3) Reducing agent in basic medium, but not in acidic medium.
(4) Oxidising agent in acidic medium, but not in basic medium.

Q.13 Which of the following compounds will produce a precipitate with $AgNO_3$?

Q.14 In a chemical reaction, A + 2B $\overset{K}{\rightleftharpoons}$ 2C + D, the initial concentration of B was 1.5 times of the concentration of A, but the equilibrium concentrations of A and B were found to be equal. The equilibrium constant (K) for the aforesaid chemical reaction is :
(1) 16   (2) 4
(3) 1   (4) 1/4

Q.15 Which of the following compounds is a constituent of the polymer

$$\left[HN-\overset{\overset{\displaystyle O}{\|}}{C}-NH-CH_3 \right]_n$$

(1) Formaldehyde   (2) Ammonia
(3) Methylamine   (4) N-Methyl urea

Q.16 At room temperature, a dilute solution of urea is prepared by dissolving 0.60 g of urea in 360 g of water. If the vapour pressure of pure water at this temperature is 35 mmHg, lowering of vapour pressure will be (molar mass of urea = 60 g mol^{-1})
(1) 0.027 mmHg   (2) 0.028 mmHg
(3) 0.017 mmHg   (4) 0.031 mmHg

Q.17 The major product of the following reaction is:

$$CH_3CH_2C = CH_2$$
(4) |
$$CO_2CH_2CH_3$$

Q.18 Match the catalysts (Column I) with products (Column II).

Column I	Column II
(A) V_2O_5	(i) Polyethylene
(B) $TiCl_4/Al(Me)_3$	(ii) ethanal
(C) $PdCl_2$	(iii) H_2SO_4
(D) Iron Oxide	(iv) NH_3

(1) (A)-(ii); (B)-(iii); (C)-(i); (D)-(iv)
(2) (A)-(iii); (B)-(i); (C)-(ii); (D)-(iv)
(3) (A)-(iii); (B)-(iv); (C)-(i); (D)-(ii)
(4) (A)-(iv); (B)-(iii); (C)-(ii); (D)-(i)

Q.19 25 g of an unknown hydrocarbon upon burning produces 88 g of CO_2 and 9 g of H_2O. This unknown hydrocarbon contains.
(1) 20g of carbon and 5 g of hydrogen.
(2) 24g of carbon and 1 g of hydrogen.
(3) 18g of carbon and 7 g of hydrogen.
(4) 22g of carbon and 3 g of hydrogen.

Q.20 Polysubstitution is a major drawback in:
(1) Reimer Tiemann reaction
(2) Friedel Craft's acylation
(3) Friedel Craft's alkylation
(4) Acetylation of aniline

Q.21 The basic structural unit of feldspar, zeolites, mica, and asbestos is :
(1) $(SiO_3)^{2-}$ (2) SiO_2

(3) $(SiO_4)^{4-}$ (4) $+Si-O)_n$ (R = Me)

$$\begin{array}{c} R \\ | \\ +Si-O)_n \\ | \\ R \end{array}$$

Q.22 A solution of $Ni(NO_3)_2$ is electrolysed between platinum electrodes using 0.1 Faraday electricity. How many mole of Ni will be deposited at the cathode?
(1) 0.20   (2) 0.05
(3) 0.10   (4) 0.15

Q.23 The type of hybridisation and number of lone pair(s) of electrons of Xe in $XeOF_4$, respectively, are :
(1) sp^3d and 1   (2) sp^3d and 2
(3) sp^3d^2 and 1   (4) sp^3d^2 and 2

Q.24 The metal d-orbitals that are directly facing the ligands in $K_3[Co(CN)_6]$ are :
(1) d_{xz}, d_{yz} and d_{z^2} (2) d_{xy}, d_{xz} and d_{yz}
(3) d_{xy} and $d_{x^2-y^2}$ (4) $d_{x^2-y^2}$ and d_{z^2}

Q.25 For a reaction scheme $A \xrightarrow{k_1} B \xrightarrow{k_2} C$, if the rate of formation of B is set to be zero then the concentration of B is given by :
(1) (k_1 / k_2) [A]   (2) $(k_1 + k_2)$ [A]
(3) k_1k_2 [A]   (4) $(k_1 - k_2)$ [A]

Q.26 The major product of the following reactions:
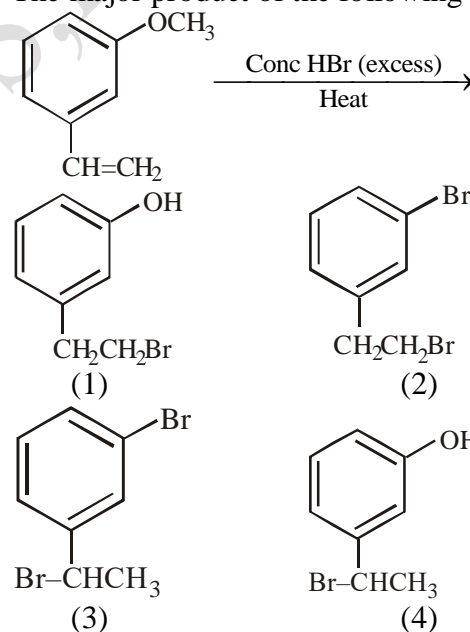
**Q.27** The relative stability of +1 oxidation state of group 13 elements follows the order :
(1) Al < Ga < Tl < In   (2) Tl < In < Ga < Al
(3) Al < Ga < In < Tl   (4) Ga < Al < In < Tl

Q.28 The aerosol is a kind of colloid in which :
(1) gas is dispersed in solid.
(2) solid is dispersed in gas.
(3) liquid is dispersed in water.
(4) gas is dispersed in liquid.

SPACE FOR ROUGH WORK

4

Q.29 Maltose on treatment with dilute HCl gives :
(1) D-Galactose
(2) D-Glucose
(3) D-Glucose and D-Fructose
(4) D-Fructose

Q.30 The process with negative entropy change is :
(1) Dissolution of iodine in water.
(2) Synthesis of ammonia from N_2 and H_2.
(3) Dissolution of $CaSO_4(s)$ to $CaO(s)$ & $SO_3(g)$
(4) Sublimation of dry ice

Q.31 The amphoteric hydroxide is :
(1) $Ca(OH)_2$ (2) $Be(OH)_2$
(3) $Sr(OH)_2$ (4) $Mg(OH)_2$

Q.32 For a reaction consider the plot of ln k versus 1/T given in the figure. If the rate constant of this reaction at 400 K is 10^{-5} s^{-1}, then the rate constant at 500K is :
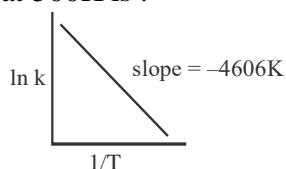
(1) 2×10^{-4} s^{-1} (2) 10^{-4} s^{-1}
(3) 10^{-6} s^{-1} (4) 4×10^{-4} s^{-1}

Q.33 The correct sequence of thermal stability of the following carbonates is
(1) $BaCO_3 < CaCO_3 < SrCO_3 < MgCO_3$
(2) $MgCO_3 < CaCO_3 < SrCO_3 < BaCO_3$
(3) $BaCO_3 < SrCO_3 < CaCO_3 < MgCO_3$
(4) $MgCO_3 < SrCO_3 < CaCO_3 < BaCO_3$

Q.34 Which of these factors does not govern the stability of a conformation in acyclic compounds ?
(1) Torsional strain
(2) Angle strain
(3) Steric interactions
(4) Electrostatic forces of interaction

Q.35 The element that usually does not show variable oxidation states is :
(1) V   (2) Ti
(3) Sc   (4) Cu

Q.36 Consider the following reduction processes :
$Zn^{2+} + 2e^- \rightarrow Zn(s)$; E° = – 0.76 V
$Ca^{2+} + 2e^- \rightarrow Ca(s)$; E° = – 2.87 V
$Mg^{2+} + 2e^- \rightarrow Mg(s)$; E° = – 2.36 V
$Ni^{2+} + 2e^- \rightarrow Ni(s)$; E° = – 0.25 V
The reducing power of the metals increases in the order :
(1) Ca < Zn < Mg < Ni (2) Ni < Zn < Mg < Ca
(3) Zn < Mg < Ni < Ca (4) Ca < Mg < Zn < Ni

Q.37 Match the metals (Column I) with the coordination compound(s) / enzyme(s) (Column II)

Column-I Metals	Column-II Coordination compound(s) / Enzyme(s)
(a) Co	(i) Wilkinson catalyst
(b) Zn	(ii) Chlorophyll
(c) Rh	(iii) Vitamin B_{12}
(d) Mg	(iv) Carbonic anhydrase

(1) a-ii ; b-i ; c-iv ; d-iii (2) a-iii ; b-iv ; c-i ; d-ii
(3) a-iv ; b-iii ; c-i ; d-ii (4) a-i ; b-ii ; c-iii ; d-iv

Q.38 The ground state energy of hydrogen atom is –13.6 eV. The energy of second excited state He$^+$ ion in eV is :
(1) –6.04   (2) –27.2
(3) –54.4   (4) –3.4

Q.39 An organic compound 'A' is oxidized with Na_2O_2 followed by boiling with HNO_3. The resultant solution is then treated with ammonium molybdate to yield a yellow precipitate. Based on above observation, the element present in the given compound is :
(1) Sulphur   (2) Nitrogen
(3) Fluorine   (4) Phosphorus

Q.40 The number of bridging CO ligand (s) and Co-Co bond (s) in $CO_2(CO)g$, respectively are :
(1) 0 and 2   (2) 2 and 0
(3) 4 and 0   (4) 2 and 1

Q.41 The increasing order of the pK_b of the following compound is :

(a)

(b)

(c)

(d)
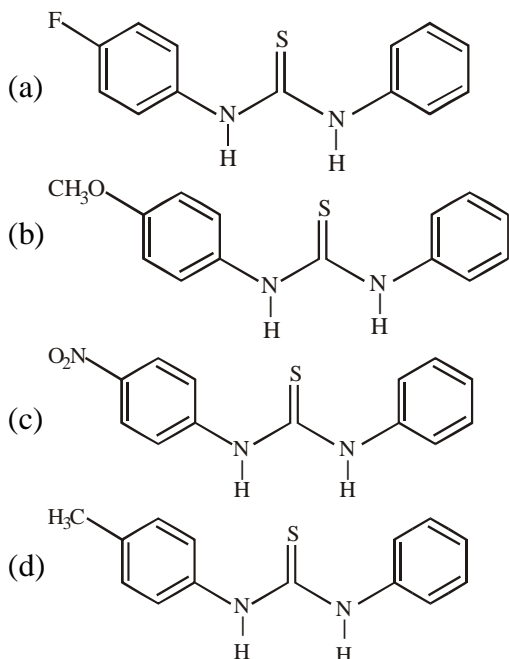
Options :
(1) $a < c < d < b$ (2) $b < d < a < c$
(3) $c < a < d < b$ (4) $b < d < c < a$

Q.42 The correct order of the first ionization enthalpies is:
(1) $Mn < Ti < Zn < Ni$ (2) $Ti < Mn < Ni < Zn$
(3) $Zn < Ni < Mn < Ti$ (4) $Ti < Mn < Zn < Ni$

Q.43 In comparison to boron, berylium has :
(1) lesser nuclear charge and greater first ionisation enthalpy.
(2) lesser nuclear charge and lesser first ionisation enthalpy.
(3) greater nuclear charge and greater first ionisation enthalpy.
(4) greater nuclear charge and lesser first ionisation enthalpy.

Q.44 In the following reaction

Carbonyl compound + MeOH $\xrightarrow{HCl}$ Acetal

Rate of the reaction is the highest for :
(1) Acetone as substrate and methanol in stoichiometric amount.
(2) Propanal as substrate and methanol in stoichiometric amount.
(3) Acetone as substrate and methanol in excess.
(4) Propanal as substrate and methanol in excess.

Q.45 Major products of the following reaction are :

$+ HCHO \xrightarrow[\text{(ii) } H_3O^+]{\text{(i) 50\% NaOH}}$

(1) CH_3OH and HCO_2H

(2)
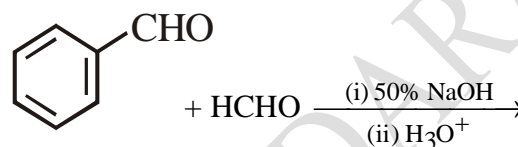
(3) CH_3OH and

(4) $HCOOH$ and

PART B – PHYSICS

Q.46 If the magnetic field of a plane electromagnetic wave is given by
(The speed of light $= 3 \times 10^8$ m/s)

$B = 100 \times 10^{-6} \sin\left[2\pi \times 2 \times 10^{15} \left(t - \dfrac{x}{c} \right) \right]$ then

the maximum electric field associated with it is
(1) 4×10^4 N/C   (2) 4.5×10^4 N/C
(3) 6×10^4 N/C   (4) 3×10^4 N/C

Q.47 The self induced emf of a coil is 25 volts. When the current in it is changed at uniform rate from 10 A to 25 A in 1s, the change in the energy of the inductance is :
(1) 437.5 J   (2) 637.5 J
(3) 740 J   (4) 540 J

Q.48 A train moves towards a stationary observer with speed 34 m/s. The train sounds a whistle and its frequency registered by the observer is f_1. If the speed of the train is reduced to 17 m/s,

the frequency registered is f_2. If speed of sound is 340 m/s, then the ratio f_1 / f_2 is :
(1) 18/17   (2) 19/18
(3) 20/19   (4) 21/20

Q.49 A hoop and a solid cylinder of same mass and radius are made of a permanent magnetic material with their magnetic moment parallel to their respective axes. But the magnetic moment of hoop is twice of solid cylinder. They are placed in a uniform magnetic field in such a manner that their magnetic moments make a small angle with the field. If the oscillation periods of hoop and cylinder are T_h and T_c respectively, then :
(1) $T_h = 0.5 T_c$ (2) $T_h = 2 T_c$
(3) $T_h = 1.5 T_c$ (4) $T_h = T_c$

Q.50 The figure shows a square loop L of side 5 cm which is connected to a network of resistances. The whole setup is moving towards right with a constant speed of 1 cms^{-1}. At some instant, a part of L is in a uniform magnetic field of 1T, perpendicular to the plane of the loop. If the resistance of L is 1.7 Ω, the current in the loop at that instant will be close to :
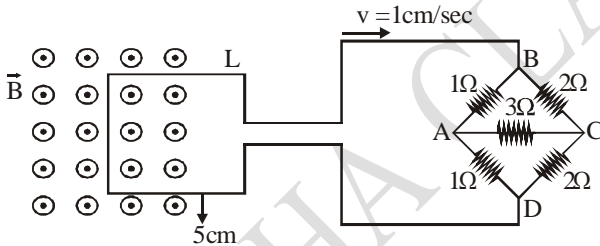
(1) 115 μA   (2) 170 μA
(3) 60 μA   (4) 150 μA

Q.51 A solid conducting sphere, having a charge Q, is surrounded by an uncharged conducting hollow spherical shell. Let the potential difference between the surface of the solid sphere and that of the outer surface of the hollow shell be V. If the shell is now given a charge of $- 4Q$, the new potential difference between the same two surfaces is :
(1) V   (2) 2V
(3) –2V   (4) 4V

Q.52 A body of mass 1 kg falls freely from a height of 100 m on a platform of mass 3 kg which is mounted on a spring having spring constant $k = 1.25 \times 10^6$ N/m. The body sticks to the platform and the spring's maximum compression is found to be x.
Given that g = 10 ms^{-2}, the value of x will be close to :
(1) 4 cm   (2) 8 cm
(3) 80 cm   (4) 40 cm

Q.53 Let ℓ, r, C and V represent inductance, resistance, capacitance and voltage, respectively. The dimension of $\dfrac{\ell}{rCV}$ in SI units will be:
(1) [LTA]   (2) $[LA^{-2}]$
(3) $[A^{-1}]$ (4) $[LT^2]$

Q.54 Two radioactive substances A and B have decay constants 5λ and λ respectively. At t = 0, a sample has the same number of the two nuclei. The time taken for the ratio of the number of nuclei to become
$(1/e)^2$ will be :
(1) $1 / 4\lambda$ (2) $1 / \lambda$
(3) $1 / 2\lambda$ (4) $2 / \lambda$

Q.55 A closed organ pipe has a fundamental frequency of 1.5 kHz. The number of overtones that can be distinctly heard by a person with this organ pipe will be : (Assume that the highest frequency a person can hear is 20,000 Hz)
(1) 7   (2) 5
(3) 6   (4) 4

Q.56 In the figure, given that V_{BB} supply can vary from 0 to 5.0 V, $V_{CC} = 5$V, $\beta_{dc} = 200$, $R_B = 100$ kΩ, $R_C = 1$ kΩ and $V_{BE} = 1.0$ V, The minimum base current and the input voltage at which the transistor will go to saturation, will be, respectively :
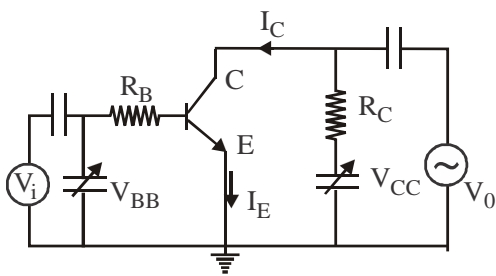
(1) 20 µA and 3.5 V   (2) 25 µA and 3.5 V
(3) 25 µA and 2.5 V   (4) 20 µA and 2.8 V

Q.57 A person standing on an open ground hears the sound of a jet aeroplane, coming from north at an angle 60° with ground level. But he finds the aeroplane right vertically above his position. If v is the speed of sound, speed of the plane is :

(1) $2v / \sqrt{3}$ (2) v

(3) v/2   (4) $\sqrt{3} \, v / 2$

Q.58 A sample of an ideal gas is taken through the cyclic process abca as shown in the figure. The change in the internal energy of the gas along the path ca is –180J. The gas absorbs 250 J of heat along the path ab and 60 J along the path bc. The work done by the gas along the path abc is :
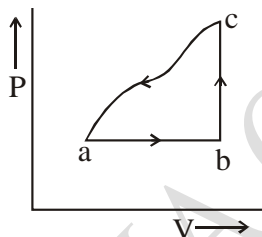
(1) 100 J   (2) 120 J
(3) 140 J   (4) 130 J

Q.59 A particle is moving along a circular path with a constant speed of 10 ms^{-1}. What is the magnitude of the change is velocity of the particle, when it moves through an angle of 60° around the centre of the circle?

(1) zero   (2) 10 m/s
(3) $10 \sqrt{3}$ m/s   (4) $10\sqrt{2}$ m/s

Q.60 A pendulum is executing simple harmonic motion and its maximum kinetic energy is K_1. If the length of the pendulum is doubled and it performs simple harmonic motion with the same amplitude as in the first case, its maximum kinetic energy is K_2. Then

(1) $K_2 = K_1 / 4$ (2) $K_2 = K_1 / 2$
(3) $K_2 = 2K_1$ (4) $K_2 = K_1$

Q.61 An upright object is placed at a distance of 40 cm in front of a convergent lens of focal length 20 cm. A convergent mirror of focal length 10 cm is placed at a distance of 60 cm on the other side of the lens. The position and size of the final image will be :

(1) 40 cm from the convergent lens, same size as the object.
(2) 20 cm from the convergent mirror, same size as the object.
(3) 20 cm from the convergent mirror, twice the size of the object.
(4) 40 cm from the convergent lens, twice the size of the object.

Q.62 The ratio of surface tensions of mercury and water is given to be 7.5 while the ratio of their densities is 13.6. Their contact angles, with glass, are close to 135° and 0°, respectively. It is observed that mercury gets depressed by an amount h in a capillary tube of radius r_1, while water rises by the same amount h in a capillary tube of radius r_2. The ratio, (r_1 / r_2), is then close to :

(1) 2/3   (2) 3/5
(3) 2/5   (4) 4/5

**Q.63** A Carnot engine has an efficiency of 1/6. When the temperature of the sink is reduced by 62ºC, its efficiency is doubled. The temperatures of the source and the sink are, respectively

(1) 124ºC, 62ºC   (2) 37ºC, 99ºC
(3) 62ºC, 124ºC   (4) 99ºC, 37ºC

Q.64 The variation of refractive index of a crown glass thin prism with wavelength of the incident light is shown. Which of the following graphs is the correct one, if D_m is the angle of minimum deviation?
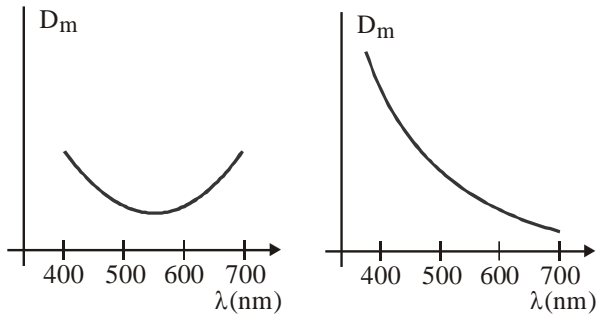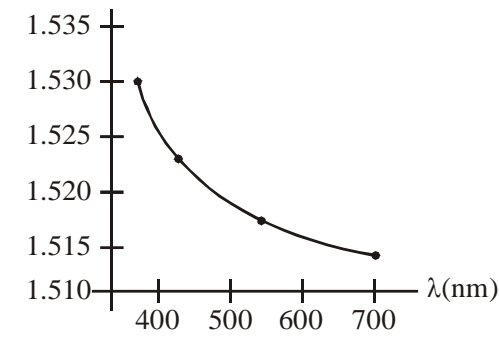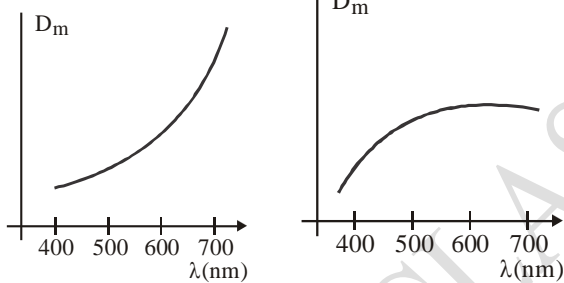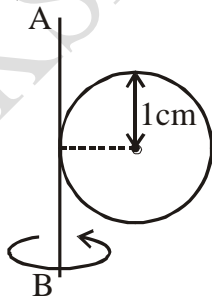
(1)   (2)

(3)   (4)

Q.65 A metal coin of mass 5 g and radius 1 cm is fixed to a thin stick AB of negligible mass as shown in the figure. The system is initially at rest. The constant torque, that will make the system rotate about AB at 25 rotations per second in 5 s, is close to :

(1) 4.0×10^{-6} Nm   (2) 2.0×10^{-5} Nm

(3) 1.6×10^{-5} Nm   (4) 7.9×10^{-6} Nm

Q.66 In the given circuit diagram, the currents, $I_1 = -0.3A$, $I_4 = 0.8$ A and $I_5 = 0.4$ A, are flowing as shown. The currents I_2, I_3 & I_6 respectively, are
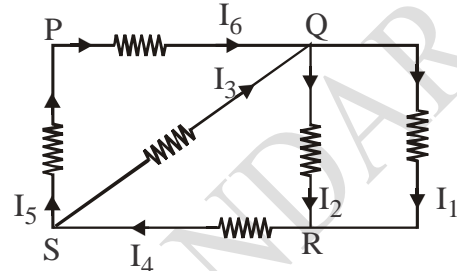
(1) 1.1 A, 0.4 A, 0.4 A   (2) $-$ 0.4 A, 0.4 A, 1.1 A

(3) 0.4 A, 1.1 A, 0.4 A   (4) 1.1 A, $-$ 0.4 A, 0.4 A

Q.67 A metal plate of area 1×10^{-4} m^2 is illuminated by a radiation of intensity 16 mW/m^2. The work function of the metal is 5eV. The energy of the incident photons is 10 eV and only 10% of it produces photo electrons. The number of emitted photo electrons per second and their maximum energy, respectively, will be

[1 eV= 1.6×10^{-19} J]

(1) 10^{10} and 5 eV   (2) 10^{14} and 10 eV

(3) 10^{12} and 5 eV   (4) 10^{11} and 5 eV

Q.68 A particle of mass 'm' is moving with speed 2v and collides with a mass 2m moving with speed v in the same direction. After collision, the first mass is stopped completely while the second one splits into two particles each of mass m, which move at angle 45° with respect to the original direction. The speed of each of the moving particle will be :

(1) $v / 2\sqrt{2}$ (2) $2\sqrt{2}v$

(3) $\sqrt{2}v$ (4) $v / \sqrt{2}$

Q.69 A transformer consisting of 300 turns in the primary and 150 turns in the secondary gives output power of 2.2 kW. If the current in the secondary coil is 10A, then the input voltage and current in the primary coil are :

(1) 220 V and 10A   (2) 440 V and 5A

(3) 440 V and 20 A   (4) 220 V and 20 A

9

Q.70 A concave mirror for face viewing has focal length of 0.4 m. The distance at which you hold the mirror from your face in order to see your image upright with a magnification of 5 is :

(1) 1.60 m (2) 0.24 m
(3) 0.16 m (4) 0.32 m

Q.71 Radiation coming from transitions n = 2 to n = 1 of hydrogen atoms fall on He$^+$ ions in n = 1 and n = 2 states. The possible transition of helium ions as they absorb energy from the radiation is :

(1) n = 1 → n = 4 (2) n = 2 → n = 4
(3) n = 2 → n = 5 (4) n = 2 → n = 3

Q.72 A boy's catapult is made of rubber cord which is 42 cm long, with 6 mm diameter of cross-section and of negligible mass. The boy keeps a stone weighing 0.02kg on it and stretches the cord by 20cm by applying a constant force. When released, the stone flies off with a velocity of 20 ms^{-1}. Neglect the change in the area of cross-section of the cord while stretched. The Young's modulus of rubber is closest to:

(1) 10^4 Nm^{-2} (2) 10^8 Nm^{-2}
(3) 10^6 Nm^{-2} (4) 10^3 Nm^{-2}

Q.73 The circuit shown below contains two ideal diodes, each with a forward resistance of 50Ω. If the battery voltage is 6V, the current through the 100Ω resistance (in Amperes) is :
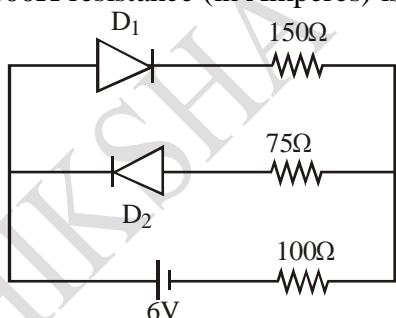

(1) 0.027 (2) 0.020
(3) 0.030 (4) 0.036

Q.74 A string is clamped at both the ends and it is vibrating in its 4th harmonic. The equation of the stationary wave is Y = 0.3 sin (0.157x) cos(200πt). The length of the string is : (All quantities are in SI units.)

(1) 20 m (2) 80 m
(3) 60 m (4) 40 m

Q.75 Two very long, straight, and insulated wires are kept at 90° angle from each other in xy-plane as shown in the figure. These wires carry currents of equal magnitude I, whose directions are shown in the figure. The net magnetic field at point P will be :
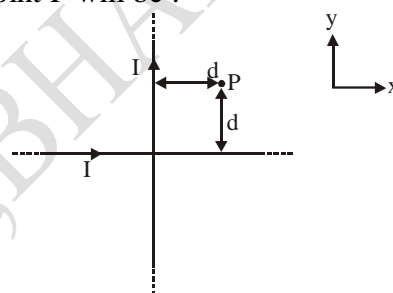
(1) Zero (2) $\dfrac{+\mu_0 I}{\pi d}(\hat{z})$

(3) $-\dfrac{\mu_0 I}{2\pi d}(\hat{x} + \hat{y})$ (4) $\dfrac{\mu_0 I}{2\pi d}(\hat{x} + \hat{y})$

Q.76 A solid sphere of mass 'M' and radius 'a' is surrounded by a uniform concentric spherical shell of thickness 2a and mass 2M. The gravitational field at distance '3a' from the centre will be :

(1) $\dfrac{2GM}{9a^2}$ (2) $\dfrac{GM}{3a^2}$

(3) $\dfrac{GM}{9a^2}$ (4) $\dfrac{2GM}{3a^2}$

Q.77 In a double-slit experiment, green light (5303 Å) falls on a double slit having a separation of 19.44μm and a width of 4.05μm. The number of bright fringes between the first and the second diffraction minima is :

(1) 09 (2) 10
(3) 04 (4) 05

SPACE FOR ROUGH WORK

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Q.78 The gas mixture consists of 3 moles of oxygen and 5 moles of argon at temperature T. Considering only translational and rotational modes, the total internal energy of the system is:

(1) 12 RT   (2) 20 RT

(3) 15 RT   (4) 4 RT

Q.79 A parallel plate capacitor having capacitance 12 pF is charged by a battery to a potential difference of 10 V between its plates. The charging battery is now disconnected and a porcelain slab of dielectric constant 6.5 is slipped between the plates the work done by the capacitor on the slab is :

(1) 692 pJ   (2) 60 pJ

(3) 508 pJ   (4) 560 pJ

Q.80 In the circuit shown, a four-wire potentiometer is made of a 400 cm long wire, which extends between A and B. The resistance per unit length of the potentiometer wire is r = 0.01 Ω/cm. If an ideal voltmeter is connected as shown with jockey J at 50 cm from end A, the expected reading of the voltmeter will be :
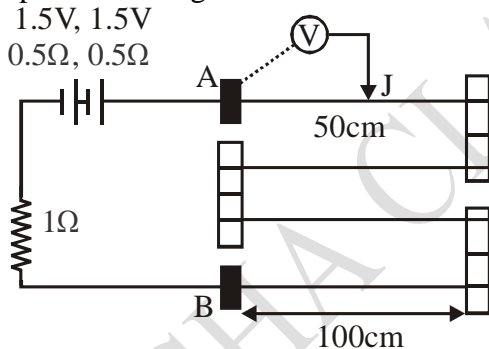
(1) 0.20 V   (2) 0.25 V

(3) 0.75 V   (4) 0.50V

Q.81 If the de-Broglie wavelength of an electron is equal to 10^{-3} times the wavelength of a photon of frequency 6×10^{14} Hz, then the speed of electron is equal to :

(Speed of light = 3×10^8 m/s

Planck's constant = 6.63×10^{-34} J.s

Mass of electron = 9.1×10^{-31} kg)

(1) 1.45×10^6 m/s   (2) 1.7×10^6 m/s

(3) 1.8×10^6 m/s   (4) 1.1×10^6 m/s

Q.82 Two weights of the mass m_1 and m_2 ($> m_1$) are joined by an inextensible string of negligible mass passing over a fixed frictionless pulley. The magnitude of the acceleration of the loads is

(1) g   (2) $\dfrac{m_2 - m_1}{m_2} g$

(3) $\dfrac{m_1}{m_2 + m_1} g$ (4) $\dfrac{m_2 - m_1}{m_2 + m_1} g$

Q.83 The ratio of resolving power of telescope, when lights of wavelength 4400Å and 5500Å are used, is ____

(1) 16 : 25   (2) 4 : 5

(3) 9 : 1   (4) 5 : 4

Q.84 A lorry and a car moving with the same K.E. are brought to rest by applying the same retarding force, then :-

(1) Lorry will come to rest in a shorter distance.

(2) Car will come to rest in a shorter distance.

(3) Both come to rest in a same distance.

(4) None of the above.

Q.85 A cockroach of mass M/2 is start moving, with velocity V on the circumference of a disc of mass 'M' and 'R', what will be angular velocity of disc?

(1) V / R   (2) V / 2R

(3) V / 4R   (4) 2V / R

Q.86 Two particles are simultaneously projected in the horizontal direction from a point P at a certain height. The initial velocities of the particles are oppositely directed to each other and have magnitude v each. The separation between the particles at a time when their position vectors (drawn from the point P) are mutually perpendicular, is –

(1) $v^2 / 2g$ (2) v^2 / g

(3) $4v^2 / g$ (4) $2v^2 / g$

SPACE FOR ROUGH WORK

Q.87 If the radii of $^{64}_{30}\text{Zn}$ and $^{27}_{13}\text{Al}$ nuclei are R_1 and R_2 respectively then $R_1 / R_2 =$
(1) 64 / 27   (2) 4 / 3
(3) 3 / 4   (4) 27 / 64

Q.88 Two polaroid are oriented with their planes perpendicular to incident light and transmission axis making an angle 30° with each other. What fraction of incident unpolarised light is transmitted:-
(1) 37.5 %   (2) 12.5 %
(3) 25 %   (4) 50 %

Q.89 A flint glass prism and a crown glass prism are to be combined in such a way that the deviation of the mean ray is zero. The refractive index of flint and crown glasses for the mean ray are 1.620 and 1.518 respectively. If the refracting angle of the flint prism is 6.0°, what would be the refracting angle of the crown prism?
(1) 6.0°   (2) 10°
(3) 7.2°   (4) 4°

Q.90 A rod is placed on a smooth horizontal surface. The stress developed when temperature is increased by 40º C
[$\alpha = 5 \times 10^{-5} \,°C^{-1}$, $? = 5 \times 10^{11}\, N/m^2$]
(1) $10^9\, N/m^2$ (2) $2 \times 10^9\, N/m^2$
(3) $10^{11}\, N/m^2$ (4) Zero

PART C – BIOLOGY

Q.91 Which phylum/group is exclusively marine ?
(1) Porifera   (2) Coelenterata
(3) Echinodermata   (4) Mollusca

Q.92 Which pollination is acheived within the same flower?
(1) Geitonogamy   (2) Cross pollination
(3) Xenogamy   (4) Autogamy

Q.93 In Citrus and Mango which cell protrude into embryosac and develop into embryos :-
(1) Placenta   (2) Funicle
(3) Nucellus   (4) Obturator

Q.94 Serum is :
(1) Blood without corpuscles and clotting factors
(2) Lymph without corpuscles

(3) Blood without fibrinogen
(4) Lymph

Q.95 Which one of the following is found only in the form of medusa ?
(1) *Hydra*   (2) *Adamsia*
(3) *Aurelia*   (4) *Leucosolenia*

Q.96 Match the column-I with column-II :-

Column-I	Column-II
A. Hexoses	I. Starch
B. Disaccharides	II. Fuctose
C. Polysaccharides	III. Lactose
D. Mucopolysaccharides	IV. Heparin

Option :
(1) A-I, B-II, C-III, D-IV
(2) A-II, B-III, C-I, D-IV
(3) A-II, B-III, C-IV, D-I
(4) A-II, B-I, C-III, D-IV

Q.97 Match the coloumn I with column II :-

Column-I	Column-II
a. Monohybrid test cross	p. Rr → Both allele expressed themselves fully
b. Dihybrid test cross	q. 1 : 1
c. Incomplete dominance	r. Rr → Produce intermediate phenotype
d. Codominance	s. 1 : 1 : 1 : 1

(1) a-q, b-r, c-s, d-p   (2) a-q, b-s, c-r, d-p
(3) a-s, b-r, c-p, d-q   (4) a-p, b-q, c-s, d-r

Q.98 Which of the nervous system transmit impulses from C.N.S. to skeletal muscle :-
(1) Sympathetic nervous system
(2) Parasympathetic nervous system
(3) Somatic neural system
(4) Autonomic neural system

Q.99 Increasing order of organic compound in protoplasm is :-
(1) Protein, Lipid, Nucleic acid Vitamine
(2) Lipid, Carbohydrate, Nucleic acid, Protein
(3) Carbohydrate, Lipid, Nucleic acid, Vitamine
(4) Protein, Lipid, Vitamine, Carbohydrate

SPACE FOR ROUGH WORK

Q.100 Vomiting centre is located in :-
(1) Pons (2) Medulla
(3) Cerebellum (4) Cerebrum

Q.101 DNA duplication takes place during :-
(1) Entire interphase (2) Only in G_1-phase
(3) Only in G_2-phase (4) Only in S-phase

Q.102 Blood passes from left ventricle to right atrium it is
(1) Pulmonary circulation
(2) Systemic circulation
(3) Coronary circulation
(4) Aortic circulation

Q.103 How many of the following are unicellular eukaryotes ?
Chlorella, Yeast, Gonyaulax, Euglena, Mycoplasma, E.coli, Archaebacteria, Diatoms, Physarum, Amoeba, Trypanosoma
(1) 3 (2) 7
(3) 8 (4) 6

Q.104 Select the correct statement.
(1) The sporophyte in liver worts is more elaborated than that in mosses.
(2) Protonema stage of mosses bear sex organs.
(3) In mosses, spores directly germinate to form leafy stage.
(4) The sporophyte in mosses is more elaborated than that in liverworts.

Q.105 The type of joint between the human skull bones is called :-
(1) Cartilaginous joint (2) Hinge joint
(3) Fibrous joint (4) Synovial joint

Q.106 Select the **incorrect** statement with respect to polygenic inheritance :-
(1) In human polygenic traits are height and skin colour.
(2) In a polygenic trait the phenotype reflects the contribution of each allele i.e. the effect of each allele is additive.
(3) A human genotype with all the dominant allels (AABBCC) will have the lightest skin colour and that with all the recessive allels (aabbcc) will have darkest skin.

(4) A human genotype with three dominant allele and three recessive alleles will have an inter mediate skin colour.

Q.107 What is the partial pressure of O_2 and CO_2 in systemic arteries is respectively ?
(1) 40 and 45 mm Hg
(2) 95 and 40 mm Hg
(3) 104 and 40 mm Hg
(4) 159 and 3 mm Hg

Q.108 Which is not related to Darwin :-
(a) Minor variation (b) Branching descent
(c) Mutation (d) Directionless variations
(e) Saltation (f) Natural selection
(1) a, b, d, f (2) a, c, d, e
(3) c, d, e (4) c, e

Q.109 A complex of ribosomes attached to a single strand of RNA is known as :
(1) Polysome (2) Polymer
(3) Polypeptide (4) Polylinker

Q.110 During which stage of prophase-I, crossing over occurs ?
(1) Leptotene (2) Zygotene
(3) Diplotene (4) Pachytene

Q.111 Choose the incorrect statement regarding actin structure :-
(1) Each actin (thin) filament is made of two F (filamentous) actins helically wound to each other.
(2) A complex protein troponin is distributed at regular intervals on the tropomyosin.
(3) Each F actin is a polymer of monomeric 'G' actin.
(4) In the resting state a subunits of troponin masks the active binding site for actin on the actin filament.

Q.112 Which uterine layer undergoes cyclic changes during menstrual cycle ?
(1) Myometrium (2) Perimetrium
(3) Endometrium (4) All

Q.113 Which of the following disease is not applicable for pedigree analysis :-
(1) Cystic fibrosis (2) Sickle Cell Anaemia
(3) Thalassemia (4) AIDS

SPACE FOR ROUGH WORK

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Q.114 On the basis of ____?___ Carl woese classified organisms into three domains :-
(1) Complexity of cell (2) Mode of nutrition
(3) Sequence of r-RNA   (4) Sequence of m-RNA

Q.115 The meselson and stahl's experiment is continued for four generations in bacteria the ratio of $N^{15}N^{15} : N^{15}N^{14} : N^{14}N^{14}$ containing DNA in fourth generation would be :-
(1) 1 : 1 : 0   (2) 1 : 4 : 0
(3) 0 : 1 : 3   (4) 0 : 1 : 7

Q.116 How many of these hormones will interact with the membrane bound receptor ?
Thyroxine, epinephrine, progesterone, relaxin, estrogen :
(1) Three   (2) Two
(3) Five   (4) One

Q.117 Removal of anthers or stamens is known as:-
(1) Stratification   (2) Emasculation
(3) Eutrophication   (4) Bagging

Q.118 Geitonogamy is :
(1) Functionally cross pollination involving pollinating agent and genetically it is similar to autogamy since the pollen grain come from another plant.
(2) Functionally self pollination it involves no pollinating agent and genetically it is similar to cross pollination since the pollen grain come from another plant.
(3) Functionally cross pollination involving pollinating agent and genetically it is similar to autogamy since the pollen grain come from the same plant.
(4) Functionally self pollination, it requires no pollinating agent and genetically it is similar to autogamy since the pollen grain come from the same flower.

Q.119 How many of the following functional component of ecosystem change during ecological succession?
Dominance, Energy usage efficiency, Species diversity, Vegetation, Stratification, Nutrient conservation, Productivity, decomposition

(1) Three   (2) Five
(3) Six   (4) Four

Q.120 Which hormone is used for confirmation of pregnancy :
(1) LH   (2) Progesterone
(3) FSH   (4) HCG

Q.121 Which one of the following option gives the correct categorisation of A, B and C ?

	A	B	C
	Monera	Protista	Plantae
(1)	BGA, *Mycoplasma*	Protozoan, Slime mould	*Solanum Mangifera*
(2)	Red algae, archaebacteria	Dinoflagellatis, Diatom	*Mucor*, Yeast
(3)	Archaebacteria, Eubacteria	Euglenoids, Green algae	Slime moulds, *Puccinia*
(4)	Eubacteria, Slime mould	*Gonyaulax,* Diatoms	*Neurospora Aspergillus*

Q.122 How many statements are true about below figure:
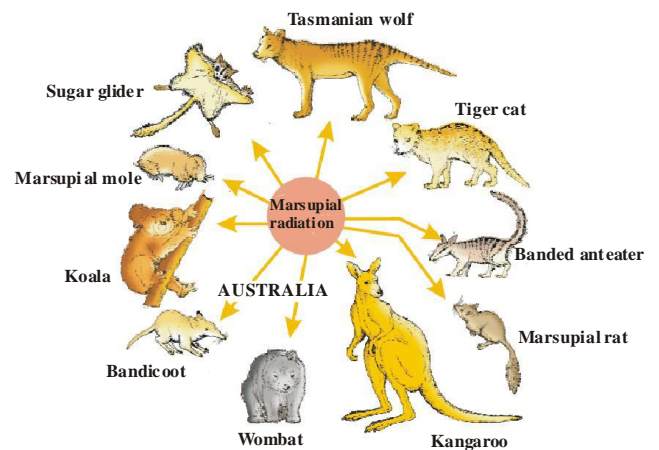
(a) These are placental mammals found in Australia.
(b) This is a type of divergent evolution
(c) They show homology
(d) These animals are found only in Australia
(1) One   (2) Three
(3) Four   (4) Two

SPACE FOR ROUGH WORK

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Q.123 What is common among aves, reptiles and mammals ?
(1) Oviparity   (2) Amniotes
(3) Dry and cornified skin (4) Poikilothermous

Q.124 Leaf mesophyll is included in :
(1) Epidermal tissue system
(2) Ground tissue system
(3) Vascular tissue system
(4) Bark

Q.125 Male gametophyte with least number of cell present in:
(1) Pteridophyta   (2) Bryophyta
(3) Gymnosperm   (4) Angiosperm

Q.126 Select the correct option that describes the source of oxytocin and its function:-

Source	Function
(1) Anterior pituitary	Parturition and lactation
(2) Ovary	Maintenance of corpus luteum and fertilization
(3) Placenta	Embryo implantation and parturition
(4) Posterior pituitary	Uterine contractions and milk ejection

Q.127 Consider the following four statements (a-d) and select the option which includes all the correct ones only -
(a) Fasciculated roots are found in asparagus.
(b) In banana plant type of stem is sucker.
(c) Rachis is present in both pinnately and palmately compound leaf.
(d) A bud is present in the axil of leaflets
(1) statement (a) and (b)
(2) statement (a) and (d)
(3) statements (a) (b) and (d)
(4) statements (b) and (c)

Q.128 How many plants are C_4 plant ?
Amaranthus, Sugarcane, Maize, Sorghum, Opuntia, Euphorbia, Wheat, Rice :
(1) 8   (2) 6
(3) 5   (4) 4

Q.129 Which one of the following is used as vector for cloning genes into several dicot plants :
(1) *Agrobacterium tumifaciens*

(2) Baculovirus
(3) *Propionibacterium sharmanii*
(4) *Glomus*

Q.130 Members of following phylum has only a single opening to the outside of body that serves as both mouth and anus :
(1) Protozoa   (2) Porifera
(3) Aschelminthes   (4) Platyhelminthes

Q.131 Which of the following factors raise the P_{50} value and shifts the HbO_2 dissociation curve to right :
a. Rise in P_{co2}
b. Fall in temperature
c. Rise in H^+ (= fall in pH)
d. Fall in diphosphoglyceric acid
(1) a and b are correct (2) b and d are correct
(3) a and c are correct (4) a, b and c are correct

Q.132 In which of the following family gynoecium is bicarpellary obigately placed and axile placentation is found
(1) Liliaceae   (2) Brassicaceae
(3) Leguminosae   (4) Solanaceae

Q.133 *Anabaena* and *Azospirillum* are :
(1) biofertilizers which are used by farmers regularly in their fields to replenish soil nutrients
(2) Biocontrol agents which are used by farmers regularly in their field to control pest.
(3) Antibiotic producing microbes to treat deadly disease such as diphtheria, plague, and whooping cough.
(4) Microbes which are used for commercial production of ethanol.

Q.134 Chemiosmotic hypothesis excludes
(1) Splitting of water molecules on inner site of membrane.
(2) Protons & hydrogen that are produced by splitting of water accumulate within Lumen of thylakoids.
(3) As electrons moves through photosystem, electrons are transports across the membrane.

SPACE FOR ROUGH WORK

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(4) NADP reductase enzyme is located on stroma side of membrane.

Q.135 Which of the following is not included in first and second line of defence :
(1) Mucosa   (2) Interferon
(3) N-K-cell   (4) B-lymphocyte

Q.136 Which of the following is correct for the origin of lysosome (L) ?
(1) ER → Golgi bodies → L
(2) Golgi bodies → ER → L
(3) Nucleus → Golgi bodies → L
(4) Mitochondria → ER → Golgi bodies → L

Q.137 Which of the following drug interferes with the transport of the neuro-transmitter dopamine ?
(1) Morphine   (2) Smack
(3) Cocaine   (4) Marijuana

Q.138 Which of the following is the main cause for the loss of biodiversity ?
(1) Habitat loss
(2) Invasion of Alien species
(3) Keeping Animals in zoological parks
(4) Overexploitation of natural Resource

Q.139 Choose the correct option for given diagram.

A   B   C   D
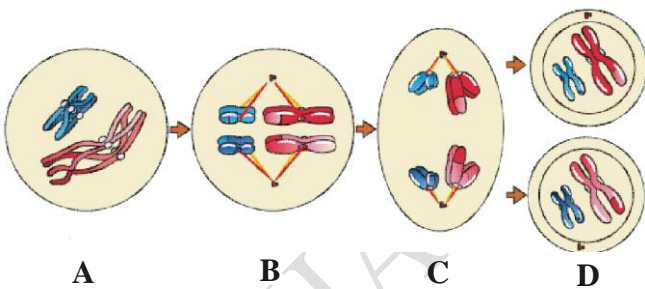
(1) A-Crossing over.
(2) B-Segregation of homologous chromosomes.
(3) C-Homologous pairs of chromosome are align on the equatorial plate.
(4) D-Nucleolus disappear.

Q.140 In banana plant, type of stem and modification of stem is respectively
(1) Rhizome and sucker
(2) Sucker and rhizome
(3) Rhiozome and corm

(4) Rhizome and stolon

Q.141 Eutrophication increases the rate of :
(1) Biological magnification
(2) Succession of water bodies
(3) Pyrolysis
(4) Global warming

Q.142 Flowering dependent on cold treatment is :
(1) Thermotropy   (2) Photoperiodism
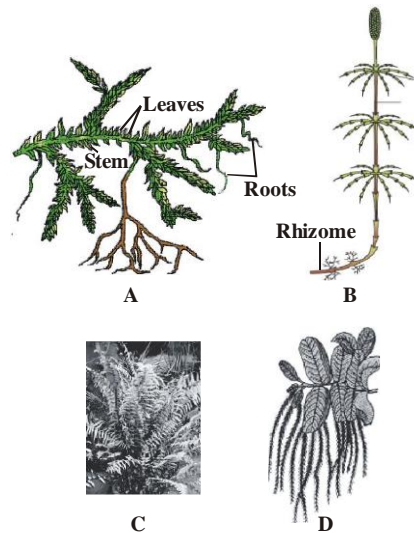(3) Cryoscopy   (4) Vernalization

Q.143 Which part of the nephron plays a role in the maintenance of pH ?
(1) PCT   (2) DCT
(3) Collecting duct (4) All

Q.144 Goblet cells are found in which of the following tissues ?
(1) Simple cuboidal   (2) Stratified squamous
(3) Glandular epithelium   (4) Stratified cuboidal

Q.145 Go through the following figures and identify these plants (A, B, C and D).

A   B

C   D

(1) A-*Equisetum*, B-*Selaginella*, F-Fern, D-*Salvinia*
(2) A-*Selaginella*, B-*Equisetum*, F-Fern, D-*Salvinia*
(3) A-Fern, B-*Salvinia*, C-*Equisetum*, D-*Selaginella*
(4) A-*Salvinia*, B-*Equisetum*, C-Fern, D-*Selaginella*

SPACE FOR ROUGH WORK

Q.146 In Citric acid cycle how many substrate level phosphorylation (s) occur between α-ketoglutaric acid and succinic acid ?
(1) Four   (2) One
(3) Two   (4) Three

Q.147 Presence of glucose and ketone bodies in urine are indicative of :
(1) Uremia   (2) Haematuria
(3) Renal calculi   (4) Diabetes mellitus

Q.148 A single stranded DNA or RNA, tagged with radioactive molecule is called :
(1) Primer   (2) Probe
(3) Isotope   (4) Vector

Q.149 Smaller animals are rarely found in polar regions, due to :
(1) Larger surface area relative to volume.
(2) Smaller surface area relative to volume.
(3) Equal surface area relative to volume.
(4) Lower temperature of polar regions.

Q.150 Which corticoid hormone involve in maintaining cardio-vascular system as well as the kidney function and antiinflammatory :
(1) Aldosterone   (2) Cortisol
(3) Adrenaline   (4) Sex-corticoid

Q.151 How many statements given below are wrong ?
(a) With repeated use of drugs, the tolerance level of the receptors present in our body increases.
(b) Smoking increases carbon monoxide (CO) content in the blood and reduces the concentration of haembound oxygen.
(c) Smack is chemically diacetylmorphine.
(d) The plant illustrated is Atropa belladona and has hallucinogenic properties.

Options :-
(1) One   (2) Two
(3) Three   (4) Four

Q.152 Which of the following statement is not **incorrect**?
(1) According to Watson-Crick model, DNA exists as a double helix, in which two strands of polynucleotides are parallel i.e. run in same direction.
(2) All types of pyrimidines are present in DNA, while only one type of pyrimidine is present in RNA.
(3) In a nucleic acid a phosphate moiety links the 3'-carbon of one sugar of one nucleotide to the 5' carbon of the sugar of succeeding nucleotide.
(4) In a nucleic acid, the bond between the phosphate and hydroxyl group of sugar is a glycosidic bond.

Q.153 Read the following four statement (a - d) :-
(a) Inbreeding exposes harmful recessive genes that are eliminated by selection.
(b) Artificial insemination helps as overcome several problems of normal matings.
(c) In MOET, the embryo at 8-32 cells stages are recovered non-surgically and transferred to surrogate mothers.
(d) A single outcross often helps to overcome inbreeding depression.
How many of the above statement are correct?
(1) Four   (2) Three
(3) Two   (4) One

Q.154 Which of the following essential element can alter the osmotic potential of a cell :-
(1) Carbon   (2) Hydrogen
(3) Potassium   (4) Oxygen

Q.155 Meiosis does not involve two sequential cycle of
(1) Karyokinesis   (2) Cytokinesis
(3) Centrioles duplication (4) DNA replication

Q.156 The components of the ecosystem are seen to function as a unit when we consider the :
(1) Productivity
(2) Energy flow
(3) Decomposition and Nutrient cycling
(4) All of the these

SPACE FOR ROUGH WORK

Q.157 Which of the following may be caused due to alcoholism :
(a) Emphysema   (b) Amnesia
(c) Bronchitis   (d) Hypoglycemia
(e) Psychosis
Choose the correct option from given :
(1) only d and e   (2) b, d, e
(3) Only b and d   (4) a, b, d, e

Q.158 Which one of the following is incorrectly matched?
(1) Dominancy of RNA world –Splicing
(2) DNA template with polarity 5' → 3'
                –Continuous replication of DNA
(3) Non-degenerate codon –UGG
(4) Chromosome number 1 of human –2968 genes

Q.159 Neoplastic transformation by DNA damage can be brought about by several factors. Choose the factors which lead to oncogenic transformation within cells.
a. UV rays   b. X-rays
c. Radiowaves   d. Tobacco smoke
e. Retrovirus
(1) a, b & c   (2) a, b, d & e
(3) a, b & d only   (4) b & d only

Q.160 Among the human ancestors the brain size was more than 1000 CC in :
(1) *Homo habilis*
(2) *Homo neanderthalensis*
(3) *Homo erectus*
(4) *Ramapithecus*

Q.161 Ligation of alien DNA at which site will lead to the loss of tetracycline resistance in pBR-322 plasmid
(1) Pvu I   (2) EcoR I
(3) Pst I   (4) Bam HI

Q.162 Identify odd one w.r.t. the stage which occurs after most vital event of sexual life cycle.
(1) Ovule to seed development
(2) PEN to endosperm development
(3) Megaspore to embryo sac development
(4) Zygote to embryo development

Q.163 Monerans with smallest living cells
(1) Have peptidoglycan nature of cell wall.
(2) Are facultative aerobes.
(3) Have both types of nucleic acids.
(4) Reproduce mainly by multiple fission.

Q.164 Which one of the following is **incorrectly** matched pair?
(1) Hypogynous flower – Mustard
(2) Axile placentation – *Argemone*
(3) Asymmetric flower – *Canna*
(4) Imbricate aestivation – Gulmohur

Q.165 High yielding and disease resistant varieties of wheat introduced in wheat growing belt of India in 1963 were
(1) Norin-10 and Sonora 64
(2) Sonalika and Kalyan sona
(3) HUW468 and P1542
(4) Jaya and ADT-37

Q.166 The pO_2 in systemic arteries and systemic veins are respectively
(1) 95 and 40 mmHg   (2) 95 and 45 mmHg
(3) 40 and 95 mmHg   (4) 104 and 40 mmHg

Q.167 Identify a, b, c and d in given diagram of female pelvis and choose the option which show correct combination :
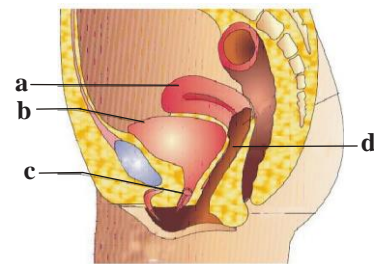
	a	b	c	d
(1)	Urethra	Vagina	Uterus	Urinary bladder
(2)	Uterus	Urinary bladder	Urethra	Vagina
(3)	Vagina	Urethra	Urinary bladder	Uterus
(4)	Urinary bladder	Uterus	Urethra	Vagina

SPACE FOR ROUGH WORK

Q.168 Which is correct for top consumers?
(a) They keeps prey populations under control.
(b) They maintains prey species diversity at community level.
(c) They exhibits a great level of assimilation efficiency, respiratory loss with prudent nature.

Option :
(1) a   (2) a, b
(3) a, c   (4) a, b, c

Q.169 The DNA polymerase (Taq polymerase) used in polymerase chain reaction (PCR) has been isolated from :
(1) Bacteria   (2) Plant
(3) Nematode   (4) Fungus

Q.170 Consider the following statements w.r.t. origin of life on earth
(a) Earliest autotrophs were oxygenic photoautotrophs.
(b) Chemical origin of life occurred in absence of molecular oxygen in warm little ponds.

Select the correct option
(1) Only (a) is correct.
(2) Only (b) is correct.
(3) Both (a) & (b) are correct.
(4) Both (a) & (b) are incorrect.

Q.171 Consider the table given below

Crop	Variety	Insect pests
a	Pusa Gaurav	Aphids
Flat bean	b	Jassids
Okra	Pusa sawani	c

Which one of the following option, gives the correct fill ups for the respective blank (a to c)
(1) a-Wheat, b-Pusa Shubhra, c-Boll worms
(2) a-Brassica, b-Pusa Komal, c-Fruit borer
(3) a-Wheat, b-Pusa Komal, c-Boll worms
(4) a-Brassica, b-Pusa Sem 2, c-Shoot borer

Q.172 The growth pattern during development of embryo from zygote in plants is
(1) Geometric growth only
(2) Arithmetic growth only
(3) First geometric then arithmetic
(4) First arithmetic then geometric

Q.173 Classification of organisms on the basis of base sequencing of nucleic acids is adopted as a criterion by
(1) Cytotaxonomist   (2) Karyotaxonomist
(3) Classical taxonomist   (4) Chemotaxonomist

Q.174 In which year Government of India passed the water (prevention and control of pollution) act?
(1) 1974   (2) 1984
(3) 1994   (4) 1987

Q.175 Leg-haemoglobin is a pigment which
(1) Is formed by bacteria and non-leguminous plants.
(2) Protects the nitrate reductase from molecular oxygen
(3) Acts as O_2 scavanger during nitrogen fixation
(4) Both (1) & (3)

Q.176 Alleles are :
(1) Slightly different forms of same gene.
(2) Slightly different forms of different genes.
(3) Different genes representing different characters.
(4) Genes located on the different locus of a chromosome.

Q.177 Choose the incorrect match w.r.t. the structures and their locations in the body of male or female cockroach.
(1) Mushroom gland – 6th–7th abdominal segments
(2) Testes – 4th – 6th abdominal segments
(3) Ovary – 2nd – 6th abdominal segments
(4) Spermatheca – 7th– 8th abdominal segments

SPACE FOR ROUGH WORK

Q.178 Find out correct recognisation sequence of following restriction endonuclease enzyme :

(1)	Bam HI GGATCC CCTAGG	Eco RI GAATTC CTTAAG
(2)	Bam HI GAATCAA CTTAGTT	Eco RI TTGCAAC AACGTTG
(3)	Bam HI GCATGG CGTACC	Eco RI AGCTCC TCGAGG
(4)	Bam HI GACTAA CTGATT	Eco RI GCCTTA CGGAAT

Q.179 If in a pond, there are 40 lotus plants last year and through reproduction 10 new plants are added, taking the current population to 50. The birth rate is as
(1) 0.25 offspring per lotus per year.
(2) 0.25 offspring per lotus per day.
(3) 0.25 offspring per total population per year.
(4) 0.5 offspring per total population per year.

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Q.180 Select the correct match w.r.t. plant growth regulators.

Column I	Column II
a. Mobilisation of nutrients	(i) Auxin
b. Eradication of weeds	(ii) Cytokinin
c. Stops cambium activity	(iii) GA$_3$
d. Bolting effect	(iv) ABA

(1) a-(ii), b-(i), c-(iv), d-(iii)
(2) a-(ii), b-(i), c-(iii), d-(iv)
(3) a-(i), b-(ii), c-(iv), d-(iii)
(4) a-(iv), b-(i), c-(iii), d-(ii)

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